Air Force Civil Engineer Center

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WILLIAMS AIR FORCE BASE

Site LF004 Landfill Remedial Action

BCT Conference Call

31 January 2017

Battle Ready…Built Right!

Site LF004
Former AST SVE System Update

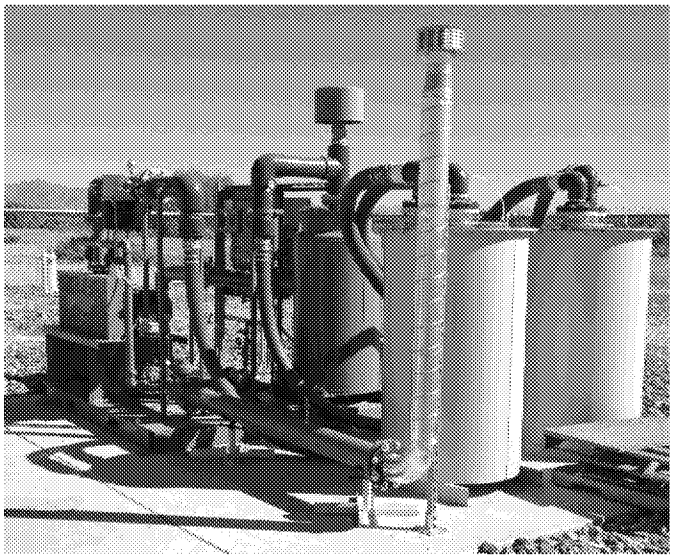
Operations Summary through 6 Jan 2017

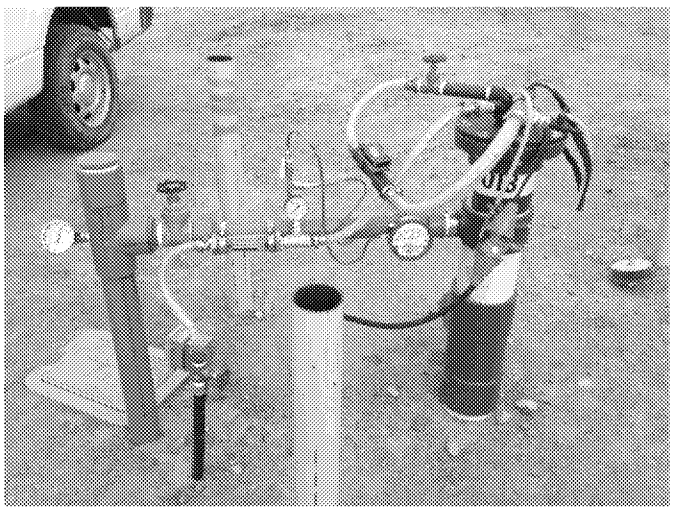
- Installed vapor monitoring probe (VMP11-D) south of SVE6-D in Aug 2016
- A grab groundwater sample collected approximately 5 ft. below the air water interface during drilling of VMP11-D indicated TCE concentrations of 0.24 µg/l in groundwater
- Analytical data (Dec 2016) indicates TCE and PCE concentration remained below soil vapor goals (SVSLs) in all SVE wells and VMPs except TCE in SVE6-D (2.4 mg/m^3 vs 2 mg/m^3) and VMP11-D (6.2mg/m^3 vs 2 mg/m^3)
- TCE inSVE6-D and VMP11-D decreased from 2.6 in Sep to 2.4 (Dec) and 13 in Sep to 6.2 (Dec),respectively
- VMP11-D connected to SVE system on 12 Oct 2016. Initial PID reading decreased from 1,053 ppmv to 27 ppmv. Current PID readings continue to decrease and are currently 18.4 ppmv. 0.6 pounds removed since 2 Dec 2016.

Site LF004
LF01-W17 Area IWAS System Update

Operations Summary through 6 Jan 2017

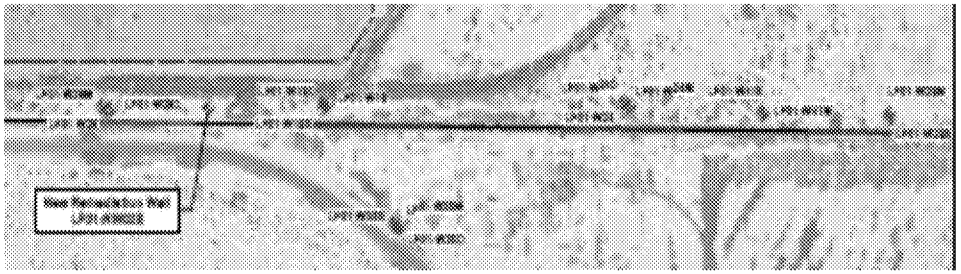
- Began operation 29 Aug 2014 (approximately 22 months of operation)
- Average 99% operational uptime for reporting period
- TCE and PCE concentrations in extracted vapor are 57 and 71 micrograms per cubic meter ($\mu g/m^3$), respectively (Dec 2016); extracted vapor concentrations remain low.
- Estimated 10.89 pounds of TCE and PCE removed by vapor extraction
- Oxidant screening indicates residual oxidant concentrations range from approximately 1 mg/L to 36 mg/L.
- All remediation wells operating following repair of RW01A and RW01D
- Nov PDB results indicate only W17S and W17M were above MCLs at 5.8 µg/l and 8.1 µg/l for TCE





Site LF004
Southern Area Oxidant Injection

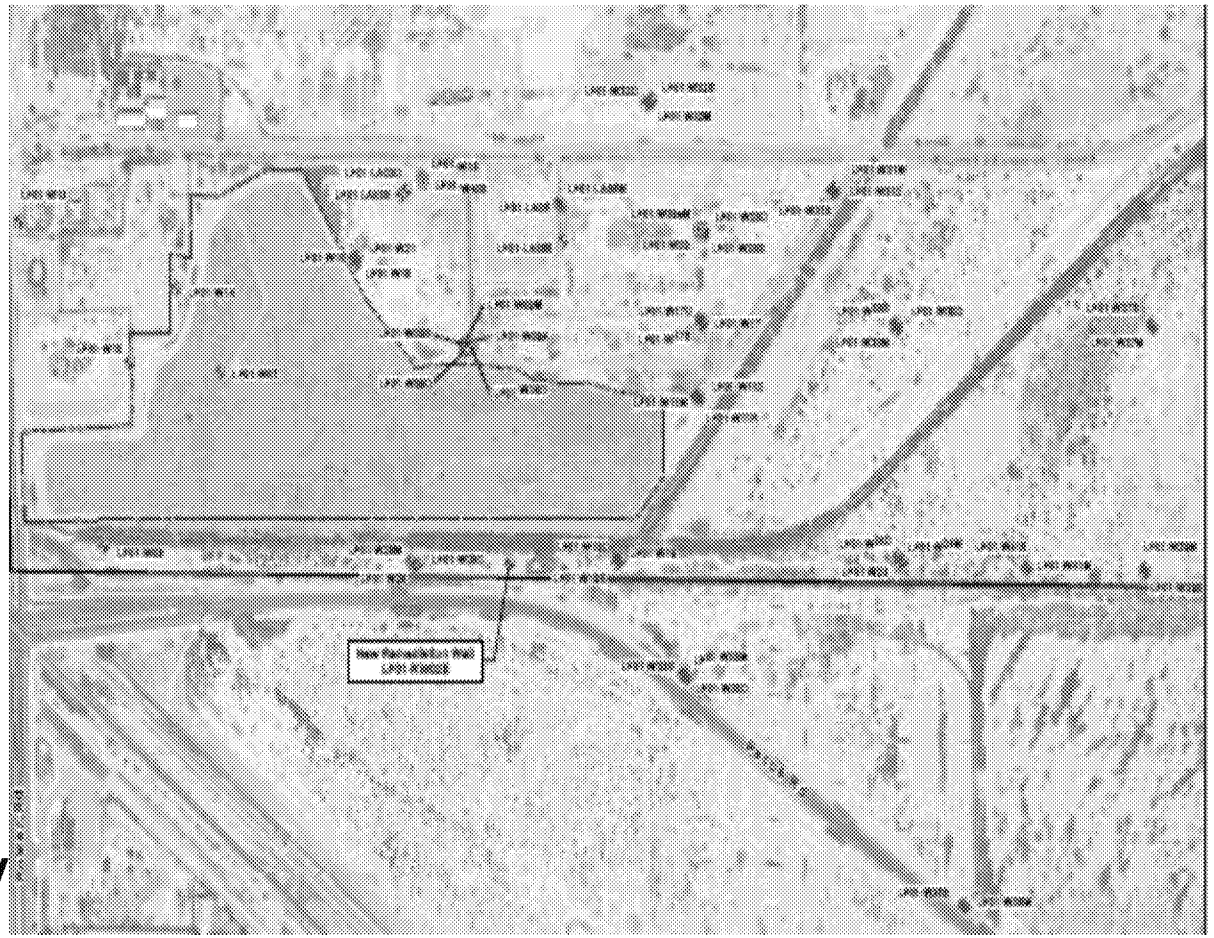
Activity Summary through 6 Jan 2017



- Began operation 15 Sep 2014 (approximately 22 months of operation)
- Field screening of residual oxidant ongoing. Oxidant concentrations were approximately 1 mg/L in LF01-W19 area and 6 to 24 mg/L in LF01-W24 area at beginning of Jan 2017
- Preliminary Nov PDB results indicate only three PCE MCL exceedances: W19S 13 µg/l (12 µg/l dup), W24S at 6.4 µg/L and W24M at 6.2 (5.4 dup) µg/l
- Installed and developed shallow remediation well (LF01-RW02E) from Jan 7 thru 20, 2017.

LF004 Groundwater Sampling (Nov 2016) Results Summary

- 51 wells sampled in Nov 2016
- *2 wells above the AWQS/MCL for TCE:*
  - LF01-W17S = 5.8 µg/L
  - LF01-W17M = 8.1 µg/L
- *3 wells above the AWQS.MCL for PCE:*
  - LF01-W19S = 13 µg/L
  - LF01-W24 = 6.4 µg/L
  - LF01-W24M = 6.2 µg/L
- Average groundwater elevation change from Nov 2015 to Nov 2016 = 0.63 ft/y



LF004 Remediation System Recent and Upcoming Activities

- Operation of IWAS and Southern Area remediation wells will continue
- Focused extraction at SVE6-D and VMP11-D (AST) by SVE system
- Quarterly vapor samples collected in Dec 2016. Analytical data indicates TCE and PCE concentration remained below soil vapor goals (SVSLs) in all SVE wells and VMPs except TCE in SVE6-D (2.4 mg/m^3 vs 2 mg/m^3) and VMP11-D (6.2mg/m^3 vs 2 mg/m^3)
- Groundwater PDB sampling completed in Nov 2016
- Groundwater sampling of LF01-RW02E followed by oxidant injections in Feb 2017
- Landfill Inspection report under AF review
- Posting of analytical data to Sharepoint will continue as results are available
- Draft LF004 Operating Properly and Successfully report under ADEQ review. EPA comments received 24 Jan 2017.

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Site ST012
Former Liquid Fuel Storage Area

BCT Conference Call
31 January 2017

Site ST012 Outline

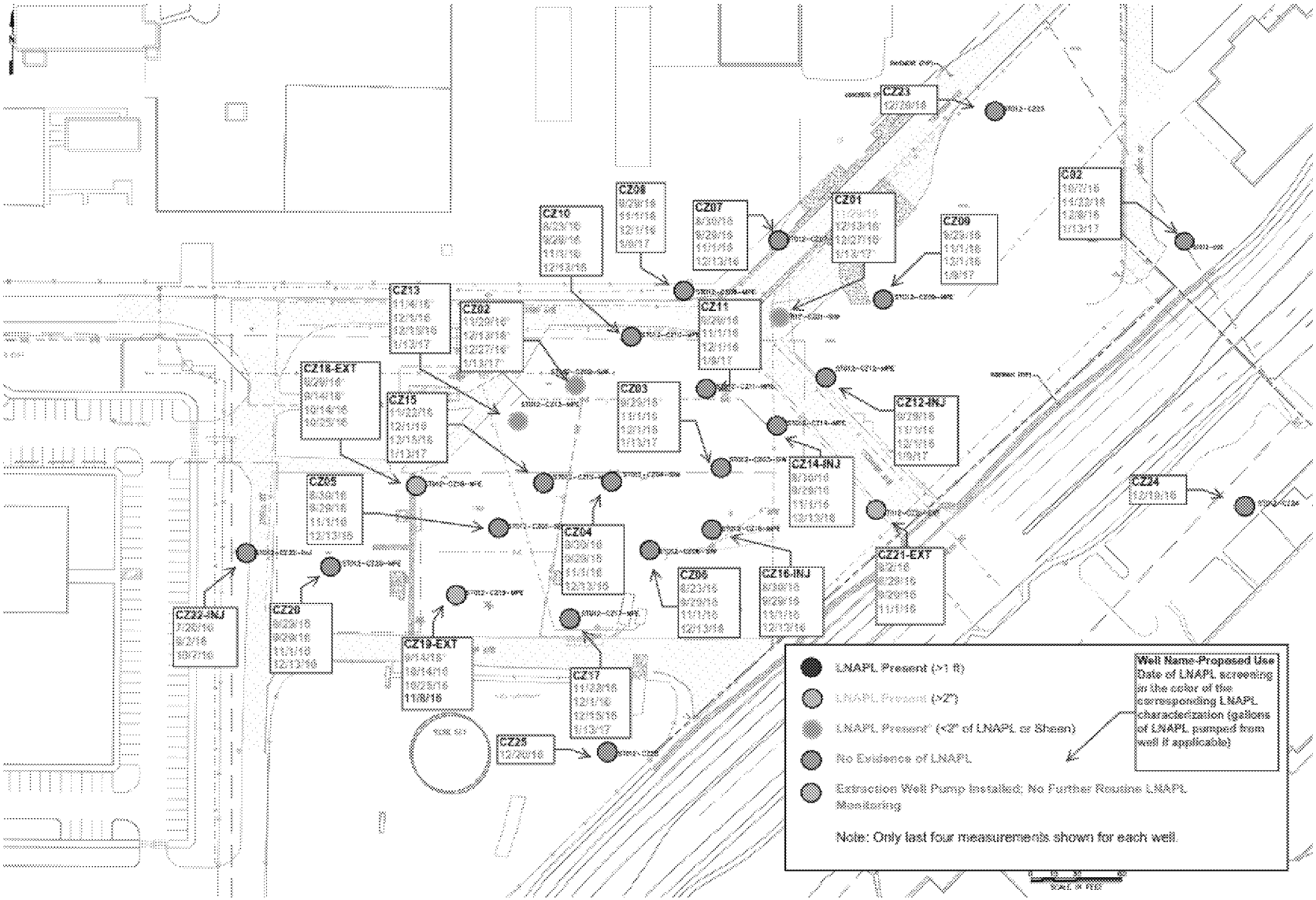
- **Summary of Activities Since Dec BCT Call**
- **LNAPL Monitoring Update**
  - **LNAPL Gauging/Removal**
- **Field Variance Memorandum Status/ Implementation**
  - **FVM4 - Additional Characterization Status**
    - Preliminary Analytical Results
  - **FVM5 - Containment Status**
    - Particle Track Analysis
    - Commissioning

Site ST012 Activities Since December

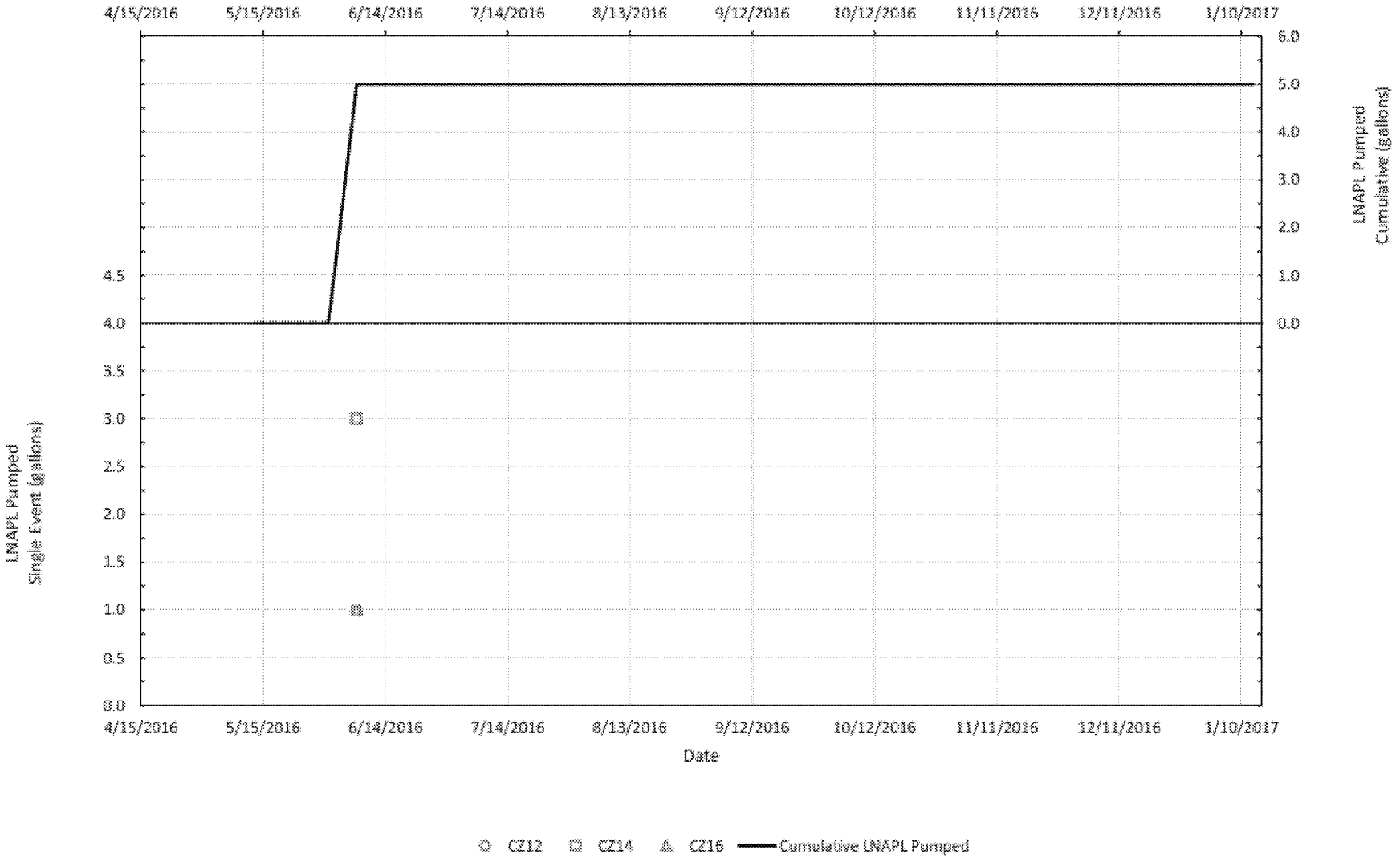
- Continued SVE operation
- Continued LNAPL screening in accessible SEE wells and Phase I characterization wells
- Completed installation of FVM4 additional characterization locations and collection of groundwater samples
- Continued installation and commissioning of hydraulic containment system

LNAPL Monitoring Update

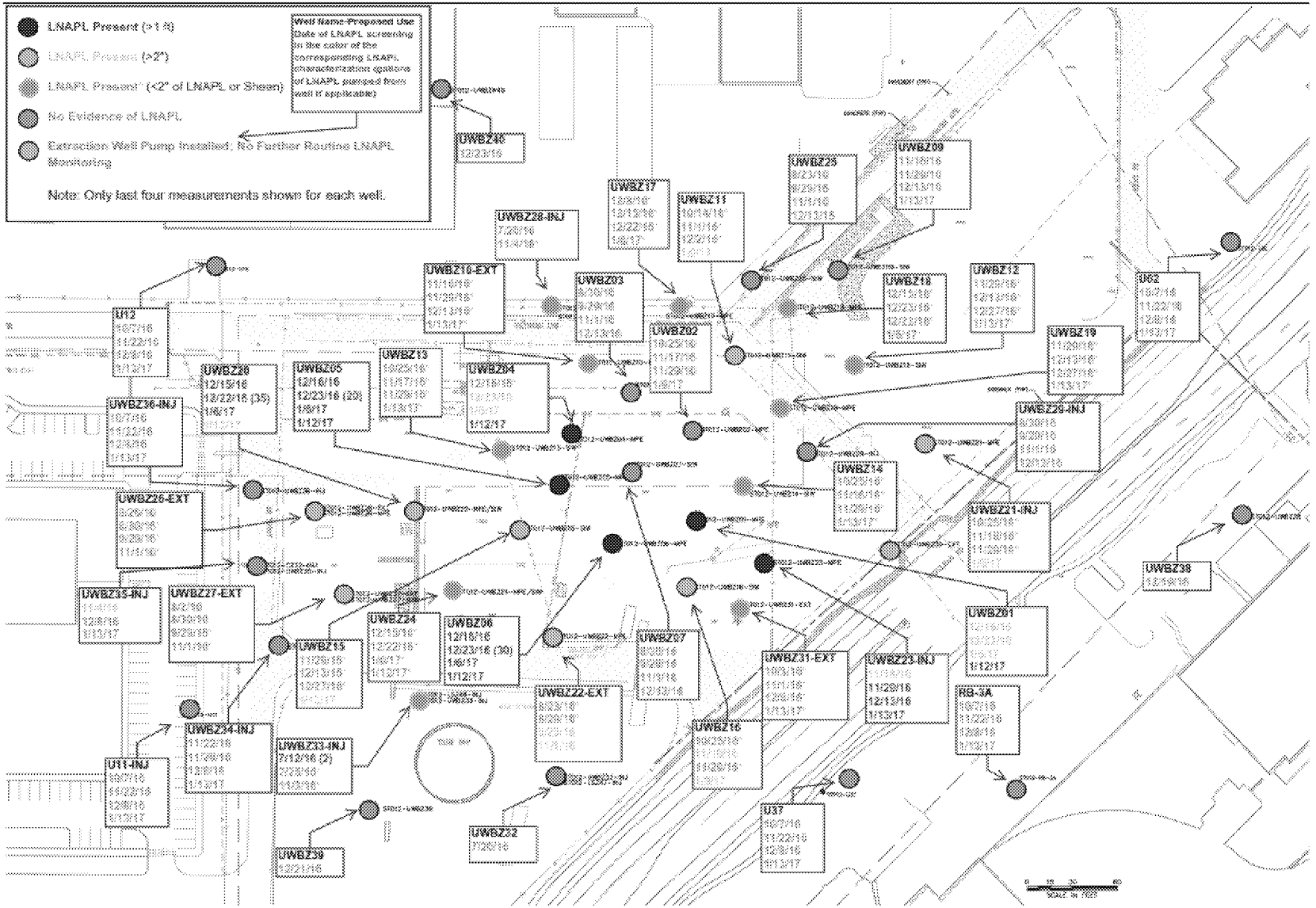
LNAPL Monitoring/Removal Status
Cobble Zone



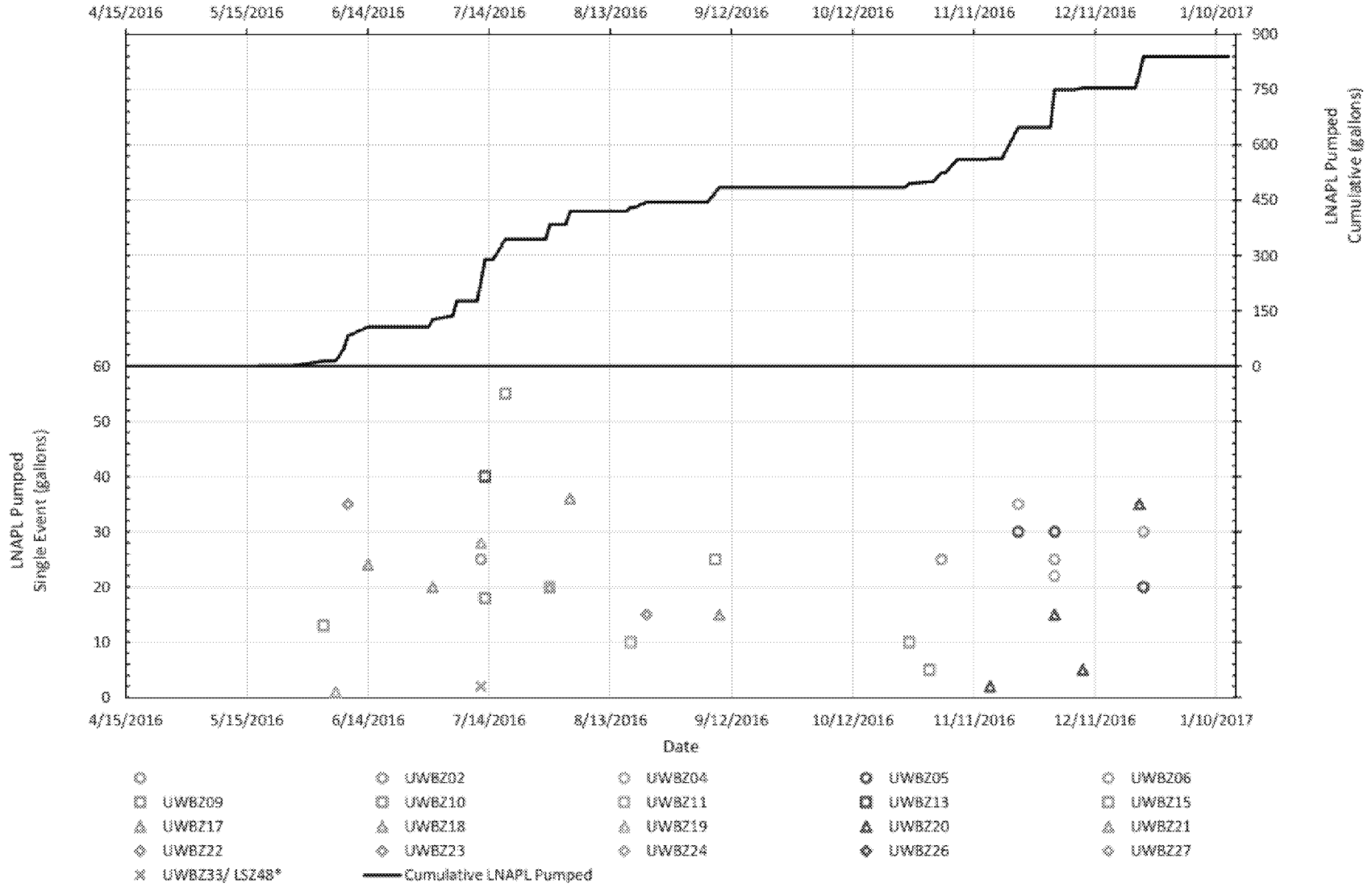
LNAPL Monitoring/Removal Status
Cobble Zone



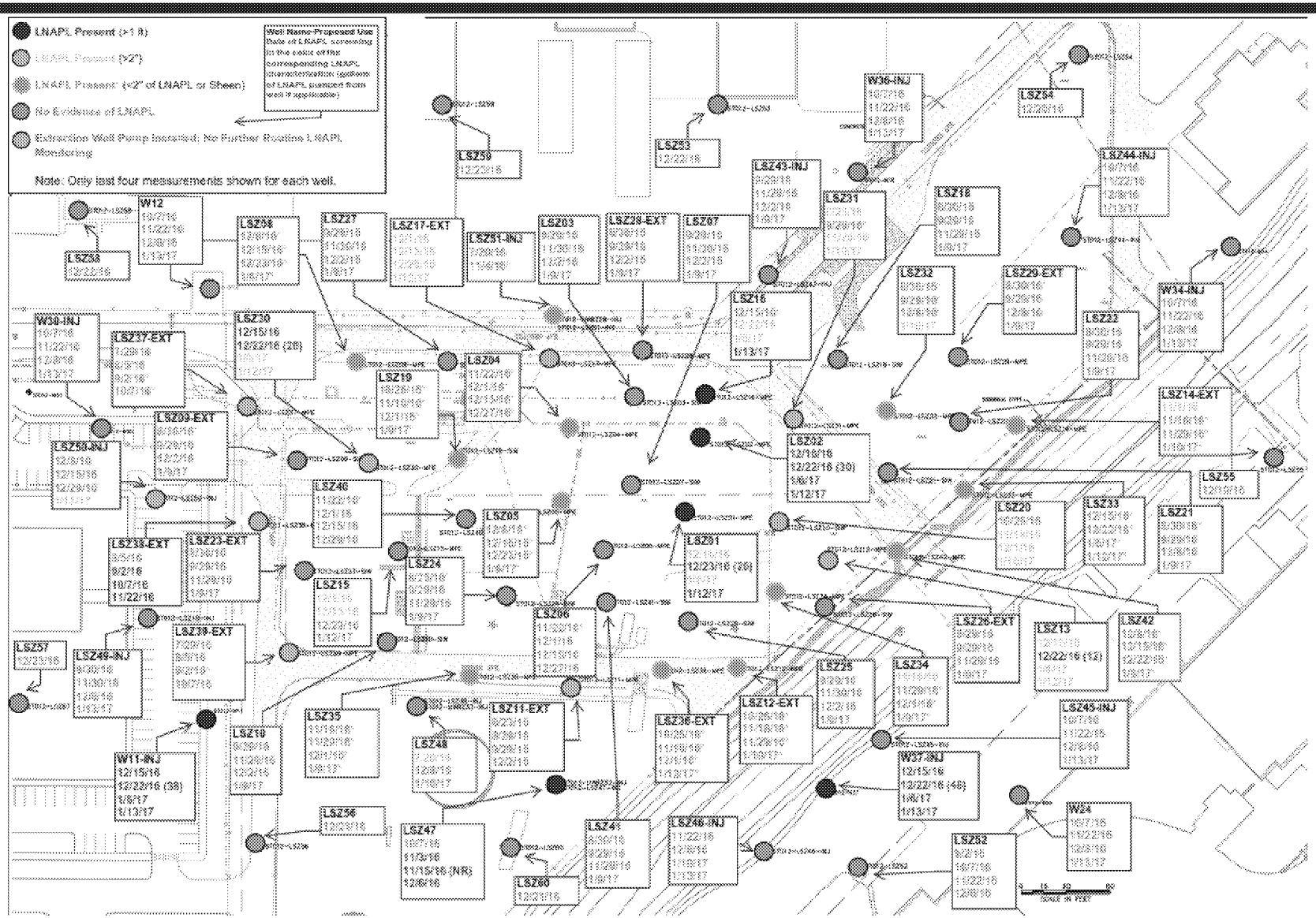
LNAPL Monitoring/Removal Status
Upper Water Bearing Zone



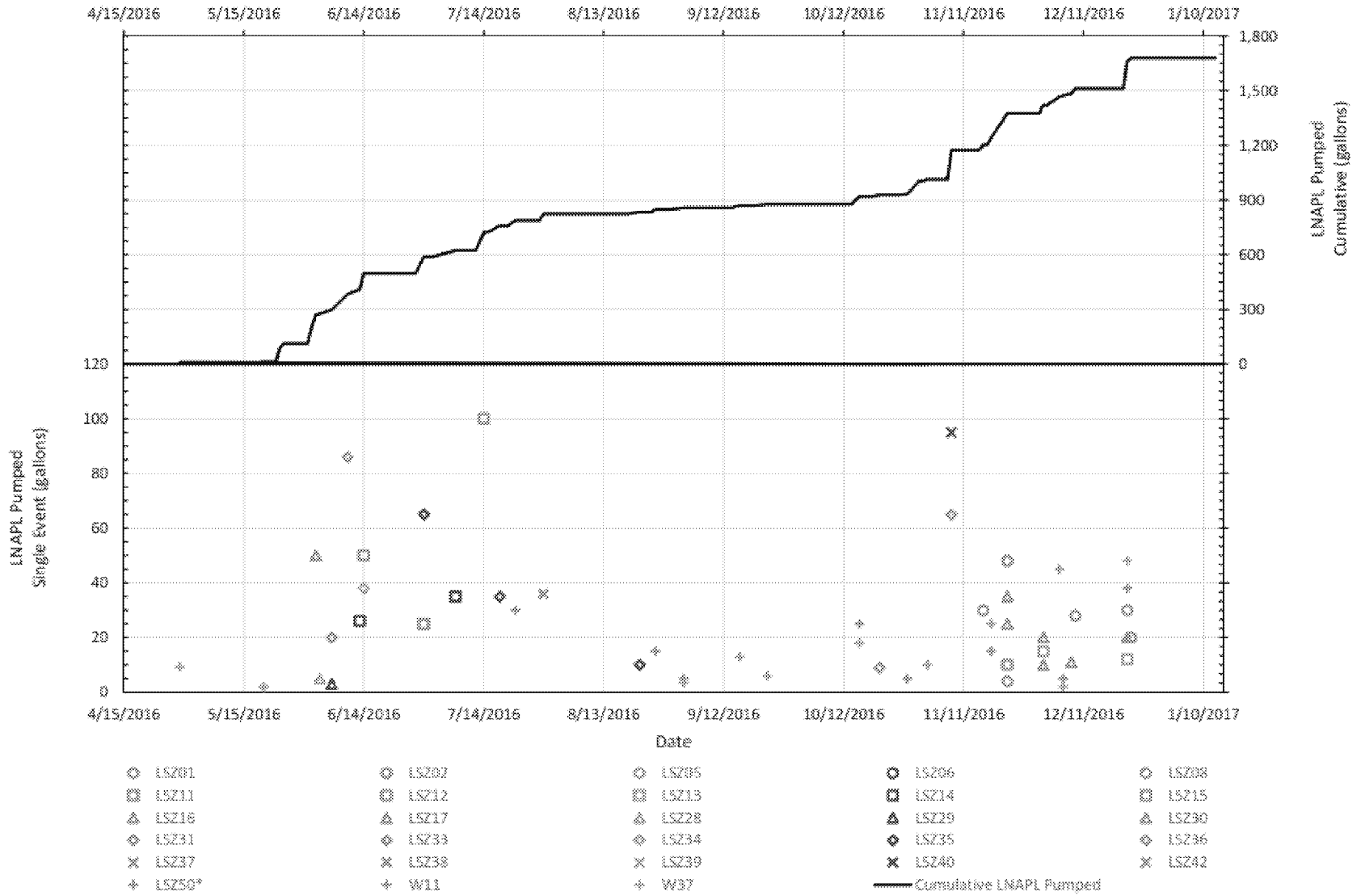
LNAPL Monitoring/Removal Status
Upper Water Bearing Zone



LNAPL Monitoring/Removal Status
Lower Saturated Zone



LNAPL Monitoring/Removal Status
Lower Saturated Zone



ST012 LNAPL Monitoring/Removal Summary

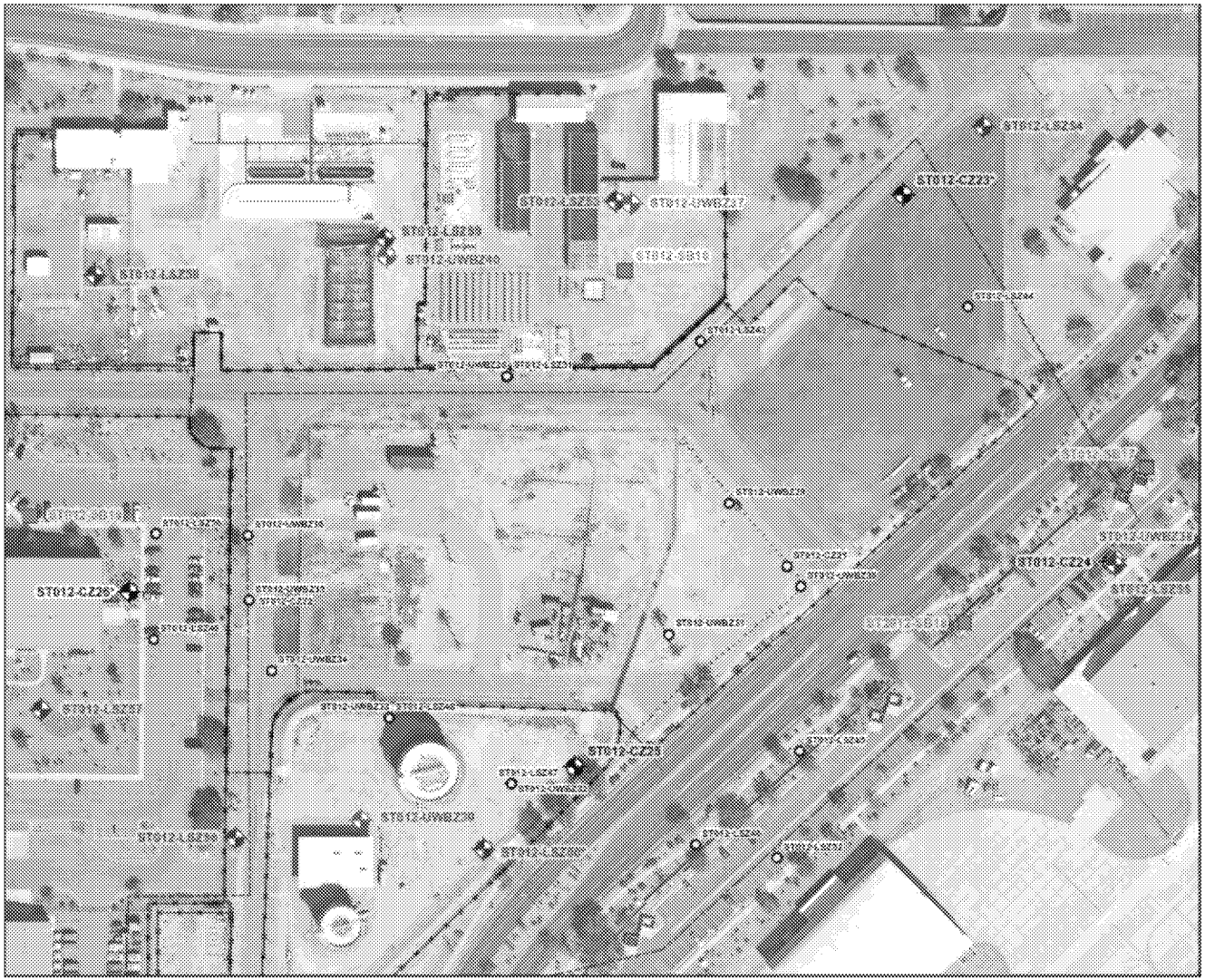
- CZ – ~5 gallons of LNAPL removed. None removed since early Jun.
- UWBZ - ~840 gallons of LNAPL removed. ~475 gallons removed during initial screening (through Jul). ~275 gallons removed following remaining eductor removals (~90 gallons of that since last call).
- LSZ - ~1,700 gallons of LNAPL removed. ~850 gallons removed during initial screening (through Jul). ~850 gallons removed following remaining eductor removals (0 gallons of that since last call).

FVM Implementation Status

Site ST012 FVM4 – Additional Characterization Path Forward

- Well development completed
- Well sampling completed week of 19 Dec
- Completed last boring/well (SB-18) in Jan 2017
- Soil and groundwater results posted to Sharepoint (data summarized on next slides)
- Evaluating results relative to containment and characterization for Feb BCT meeting

FVM4 - Additional Characterization Locations (Planned)



Legend

Proposed Characterization Investigation

- Upper Water-Bearing Zone Groundwater Monitoring Well Location
- Cobble Zone Groundwater Monitoring Well Location
- Lower Saturated Zone Groundwater Monitoring Well Location
- Soil Boring Location

Existing Features

- EBR Well Location
- Fence Line
- ST012 Site Boundary

Notes:

* Installation of well is contingent on additional sampling. See Drilling Plan table for details.

ST012-LSZ43 Well Identification

EBR Enhanced Bioremediation

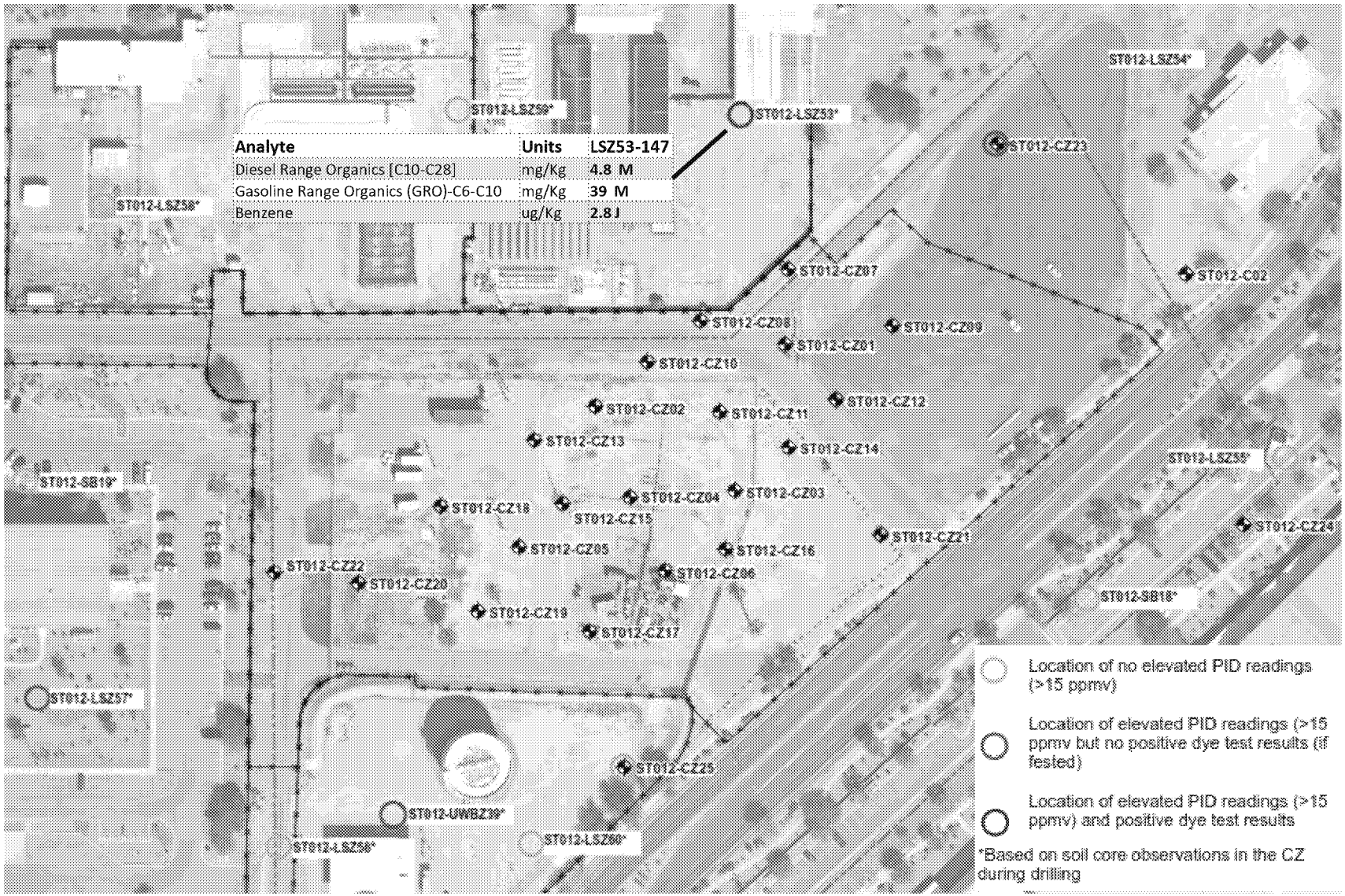
Yellow highlighted locations completed as part of additional characterization

Surveyed locations shown on subsequent slides

ST012 FVM4 - Additional Characterization

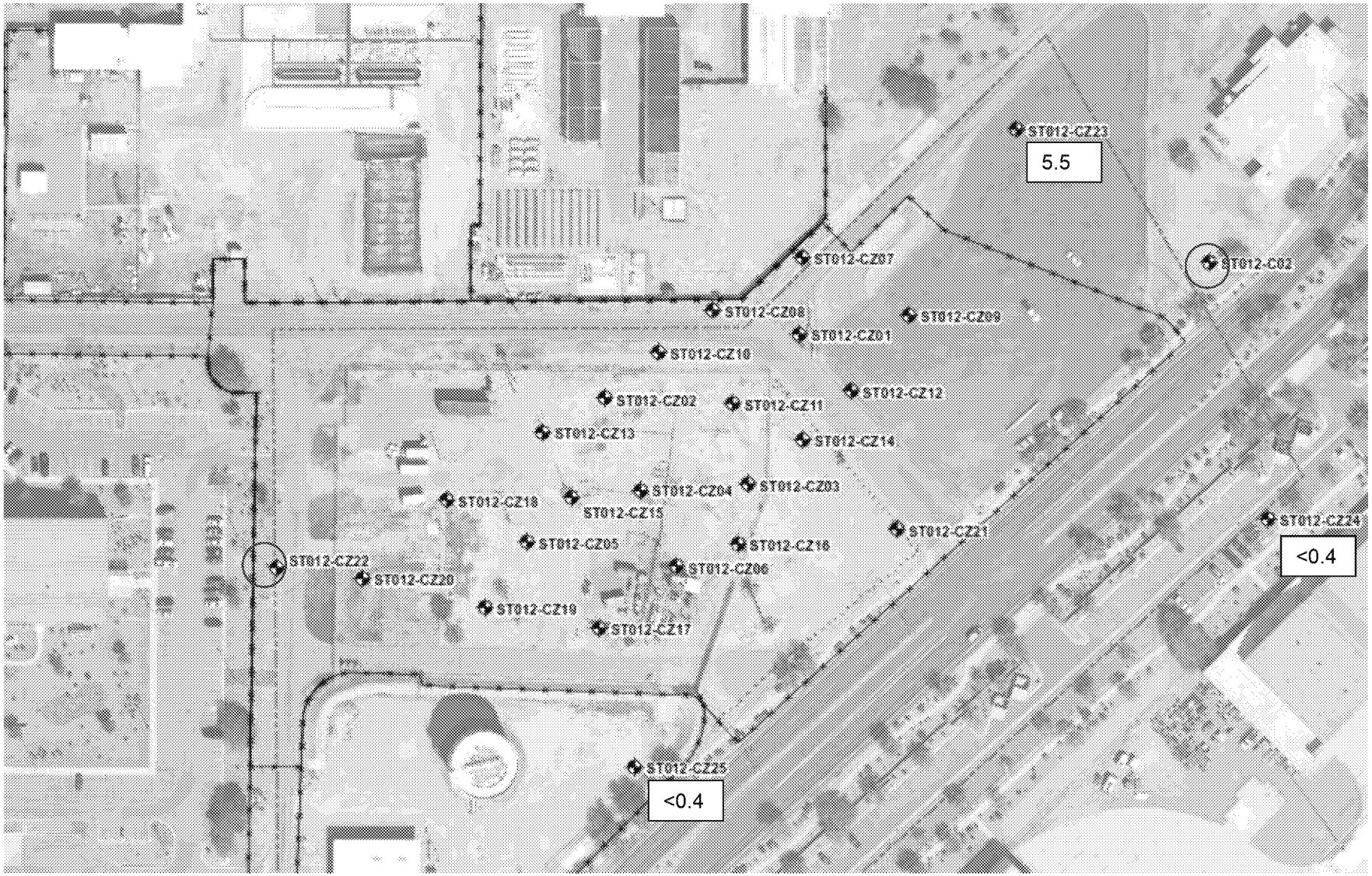
- **The following locations completed since Dec BCT call:**
  - **ST012-SB18 – No significant PID readings in CZ or UWBZ. PID (up to 423 ppmv) and positive dye tests in LSZ (205 to 215 ft bgs) - well not installed due to positive dye test per FVM**
- **The following locations were discussed in Nov & Dec BCT calls**
  - **ST012-CZ23, ST012-CZ24/UWBZ38, ST012-CZ25, ST012-UWBZ37/LSZ53, ST012-UWBZ39, ST012-UWBZ40/LSZ59, ST012-LSZ54, ST012-SB17/LSZ55, ST012-LSZ56, ST012-LSZ57, ST012-LSZ58, ST012-LSZ60, and ST012-SB19**
- **The following locations were not installed as discussed in Dec BCT call**
  - **ST012-CZ26, ST012-UWBZ37, ST012-SB16**

Site ST012 Additional Characterization
CZ Soil Results



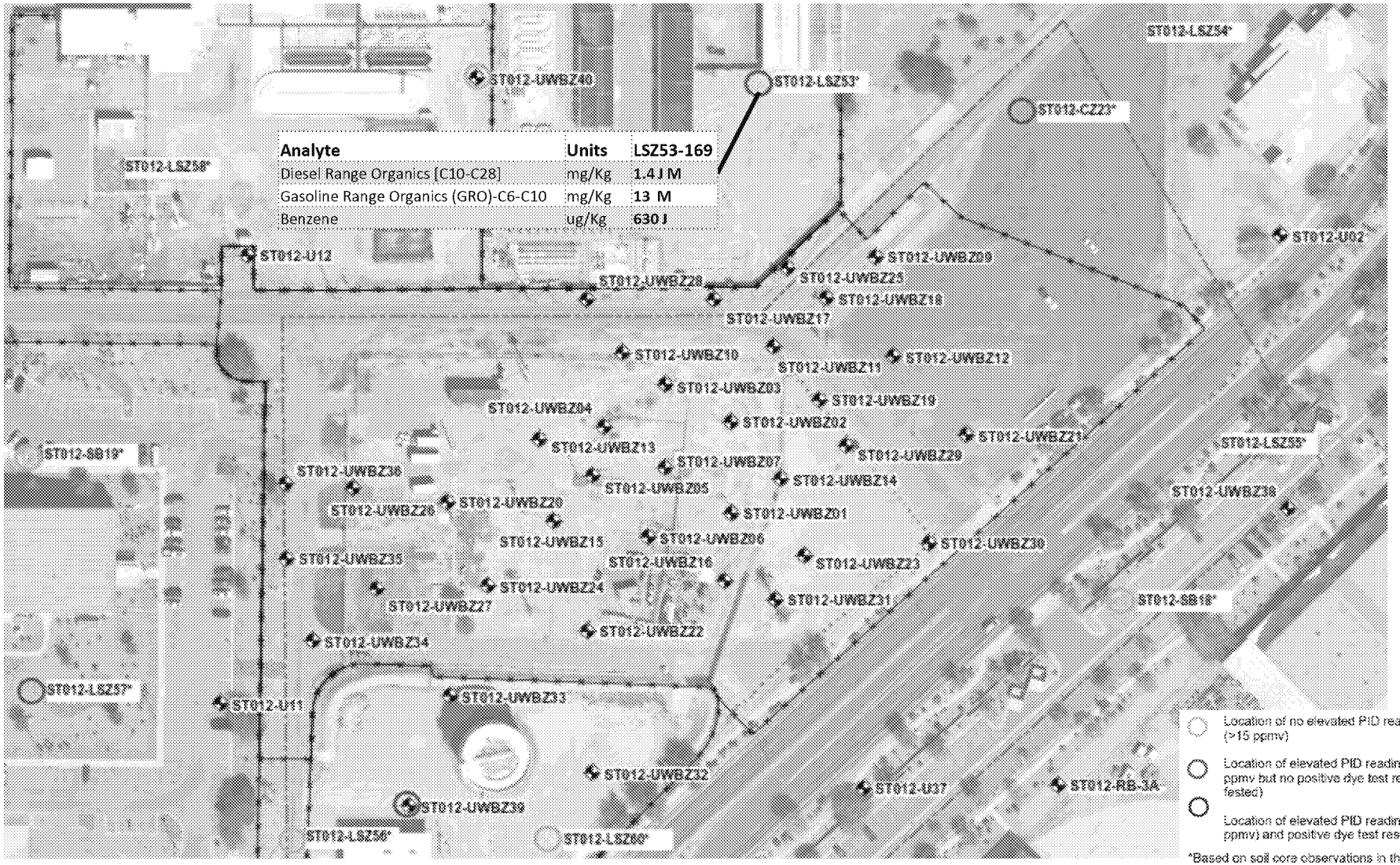
Analyte	Units	LSZ53-147
Diesel Range Organics [C10-C28]	mg/Kg	4.8 M
Gasoline Range Organics (GRO)-C6-C10	mg/Kg	39 M
Benzene	ug/Kg	2.8 J

Site ST012 Additional Characterization
CZ Groundwater Benzene Results (µg/L)

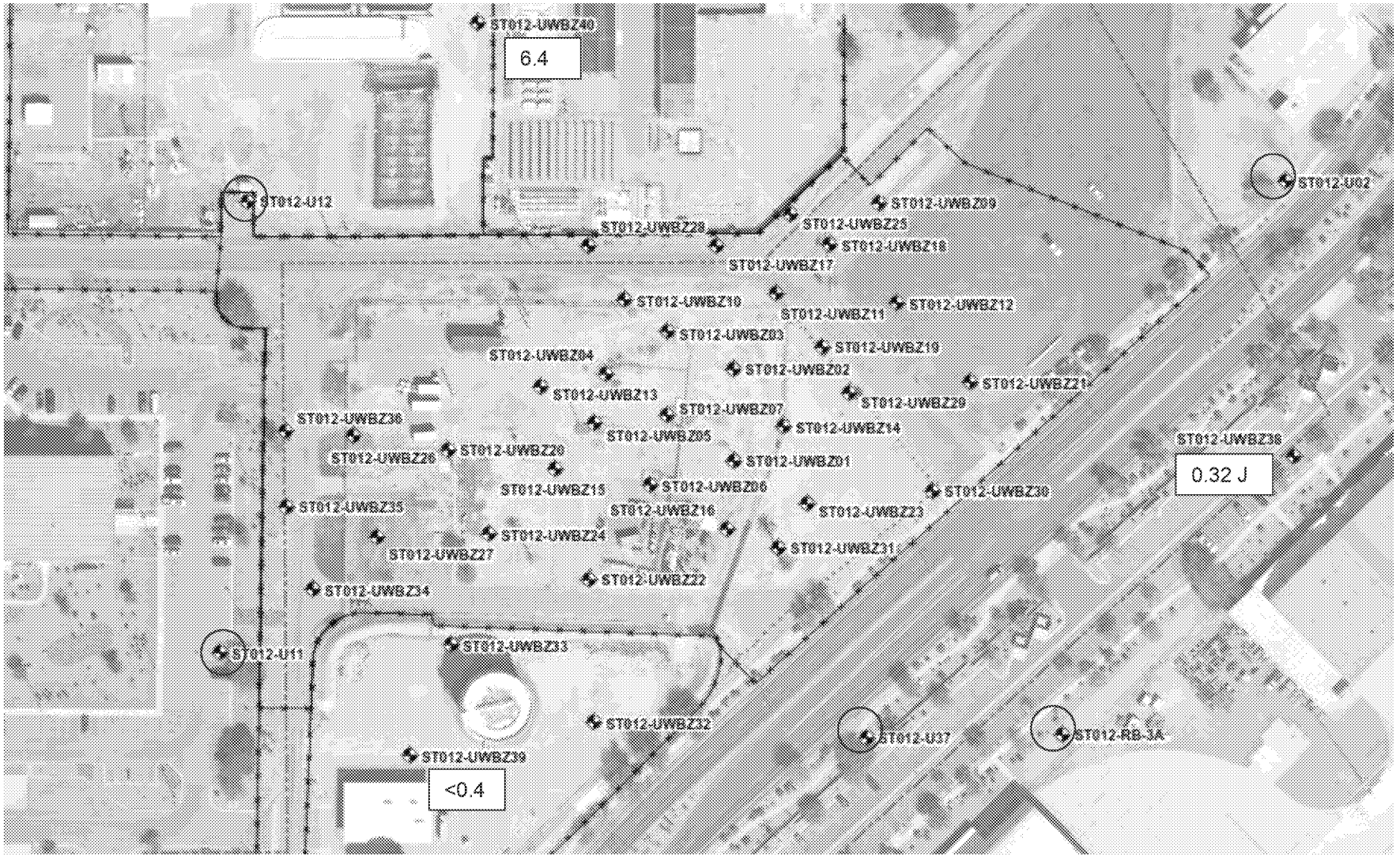


Perimeter well below MCLs in recent sampling

Site ST012 Additional Characterization
UWBZ Soil Results



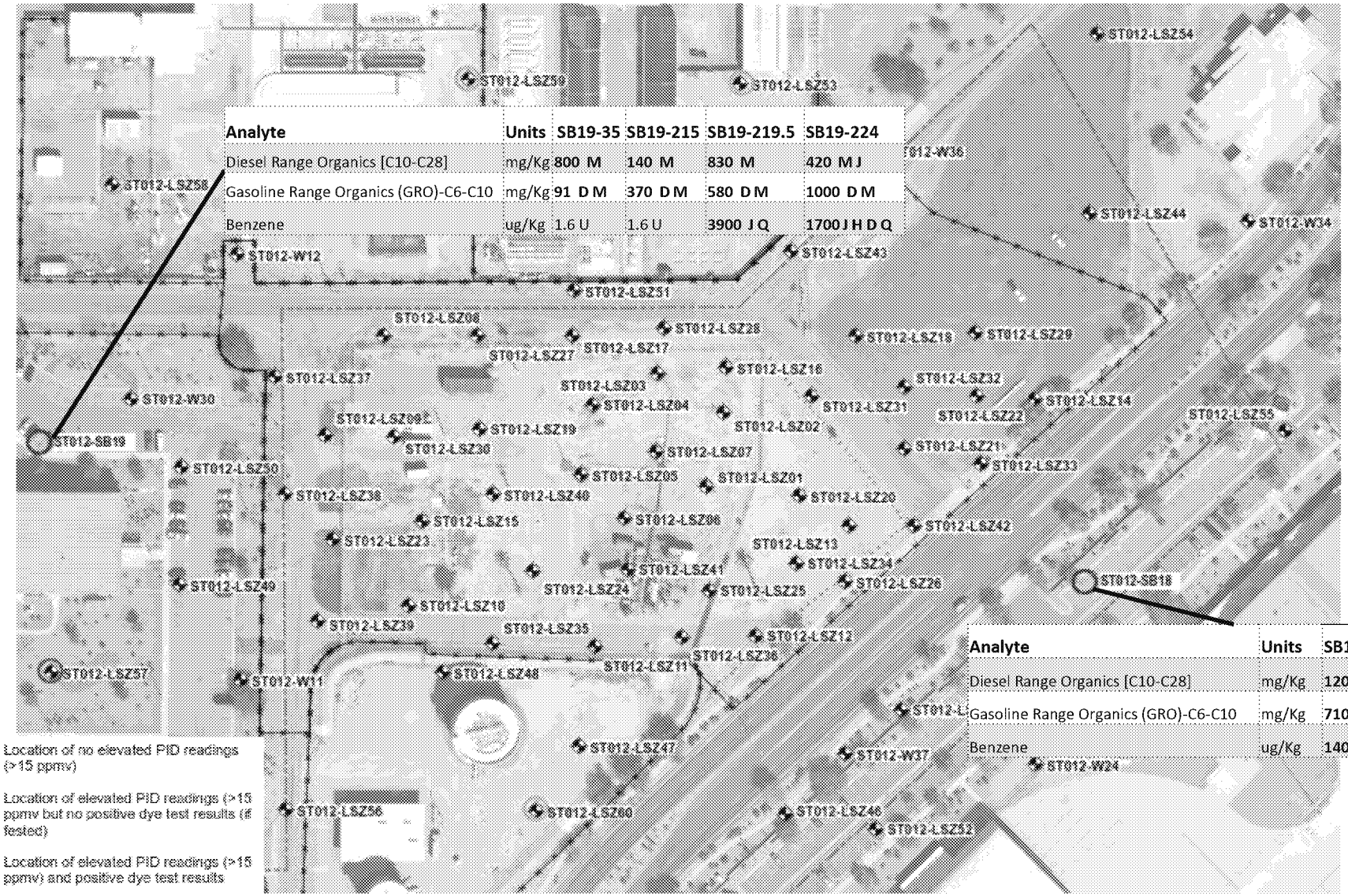
Site ST012 Additional Characterization
UWBZ Groundwater Benzene Results (µg/L)



1/27/2017

Perimeter well below MCLs in recent sampling

Site ST012 Additional Characterization LSZ Soil Results

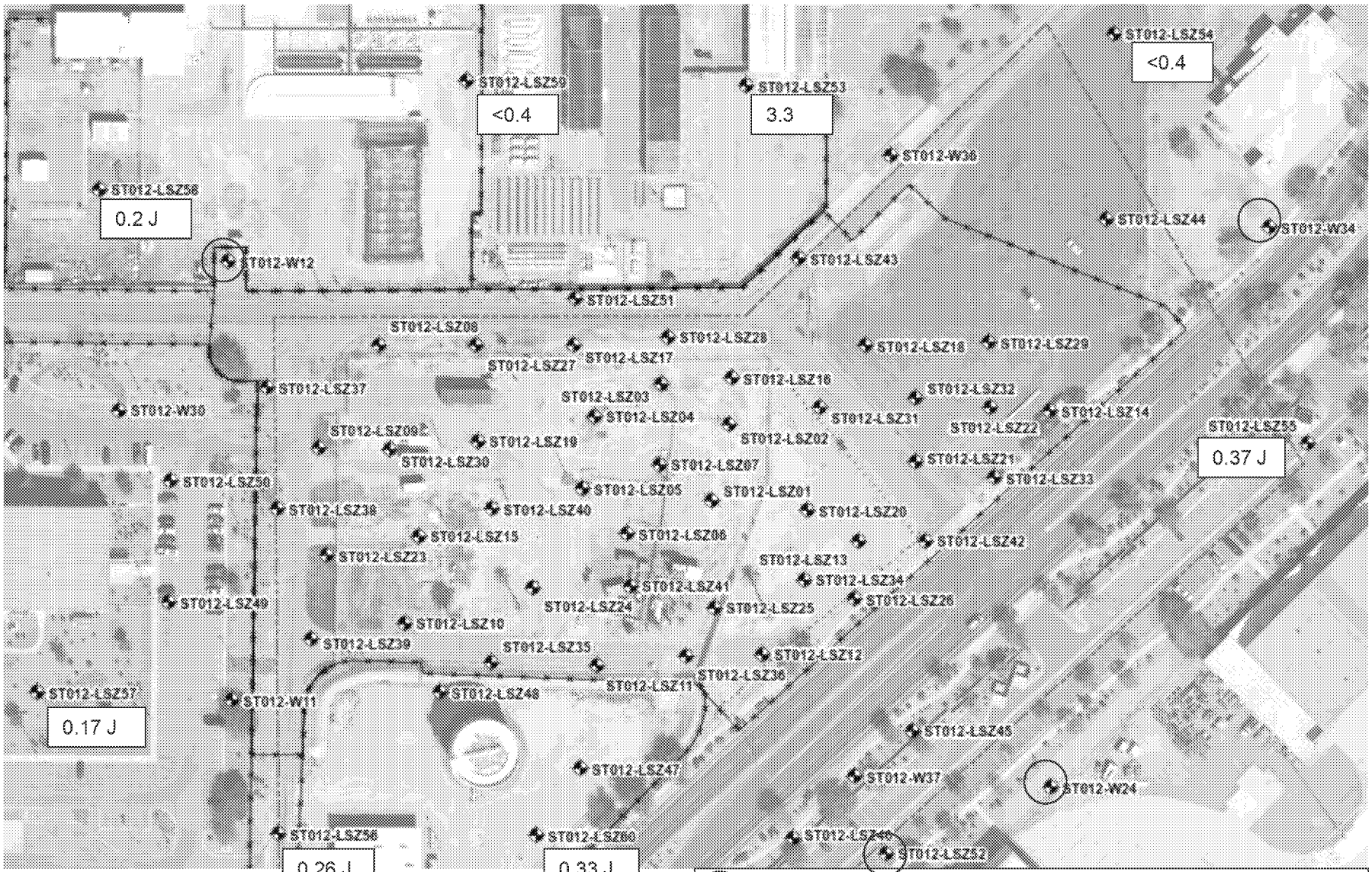


Analyte	Units	SB19-35	SB19-215	SB19-219.5	SB19-224
Diesel Range Organics [C10-C28]	mg/Kg	800 M	140 M	830 M	420 M J
Gasoline Range Organics (GRO)-C6-C10	mg/Kg	91 D M	370 D M	580 D M	1000 D M
Benzene	ug/Kg	1.6 U	1.6 U	3900 J Q	1700 J H D Q

Analyte	Units	SB18-205	SB18-2
Diesel Range Organics [C10-C28]	mg/Kg	1200 D M	1500 D
Gasoline Range Organics (GRO)-C6-C10	mg/Kg	7100 D M	15000 D
Benzene	ug/Kg	14000 D	14000

- Location of no elevated PID readings (>15 ppmv)
- Location of elevated PID readings (>15 ppmv but no positive dye test results (if tested)
- Location of elevated PID readings (>15 ppmv) and positive dye test results

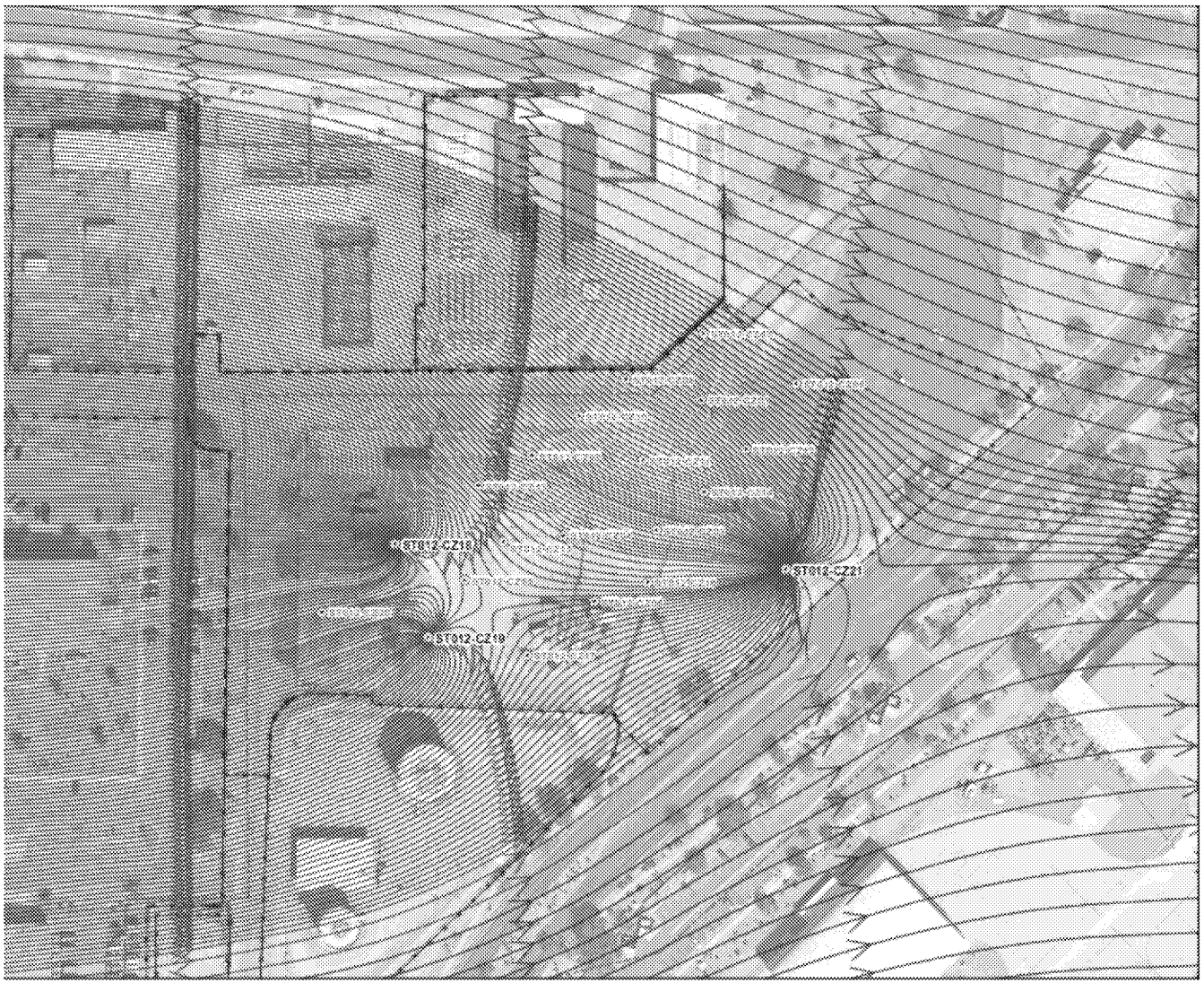
Site ST012 Additional Characterization
LSZ Groundwater Benzene Results (µg/L)



ST012 FVM5 - Containment

- **Particle Track Analysis**
  - **Used 3D groundwater model as described in RD/RAWP and RD/RAWP Addendum 2**
  - **Particle tracks originate on western model boundary**
  - **Original pumping network from RD/RAWP Addendum 2 and FVM5 evaluated**
  - **Modified pumping network evaluated to achieve hydraulic containment**
  - **Results documented in FVM5A**

ST012 FVM5 – CZ Pathlines – Original Pumping Configuration



Legend

- Extraction Well Location
- Existing Well Location
- Uncaptured Pathline
- Captured Pathline

Observations

- **Capture of SEE TTZ area**
- **Improved capture on north desirable for hydraulic containment**

ST012 FVM5 – CZ Pathlines – Revised Pumping Configuration

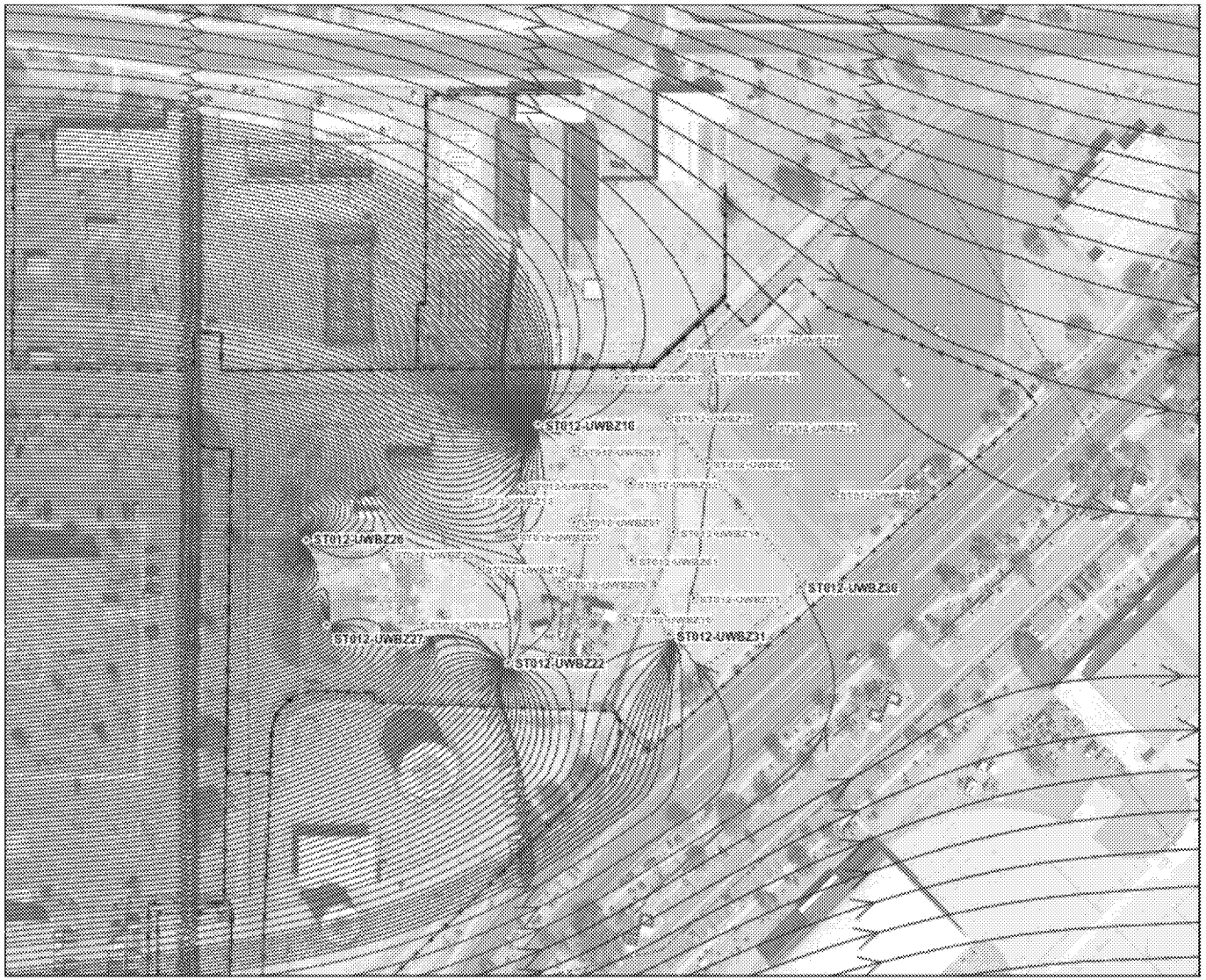
Legend

- Extraction Well Location
- Existing Well Location
- Uncaptured Pathline
- Captured Pathline

Optimization

- **Added pumping at ST012-CZ07 and ST012-CZ08 using high temperature pneumatic pumps at 3.5 gpm each**

ST012 FVM5 – UWBZ Pathlines – Original Pumping Configuration



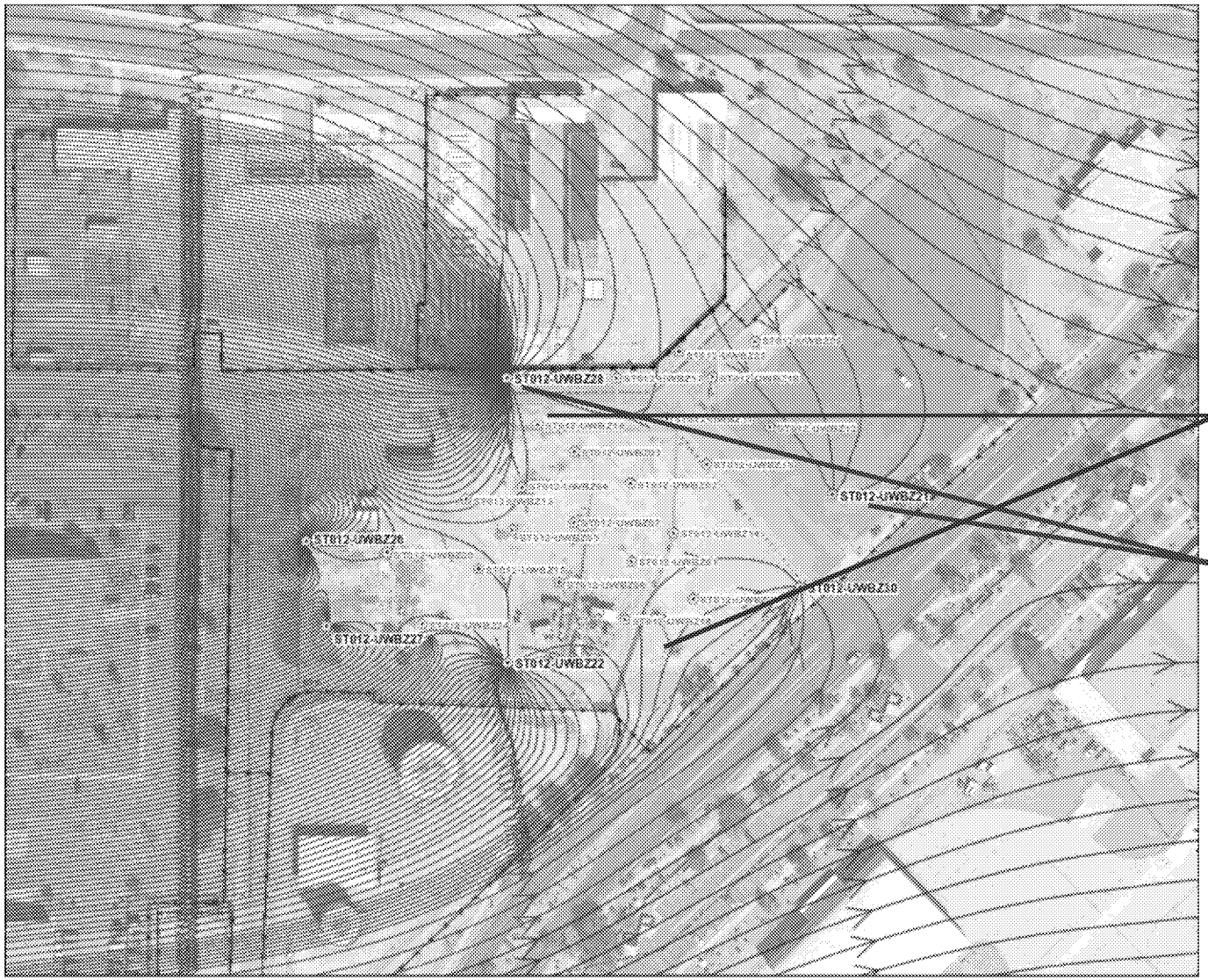
Legend

- Extraction Well Location
- Existing Well Location
- Uncaptured Pathline
- Captured Pathline

Observations

- **Capture of SEE TTZ area**

ST012 FVM5 – UWBZ Pathlines – Revised Pumping Configuration



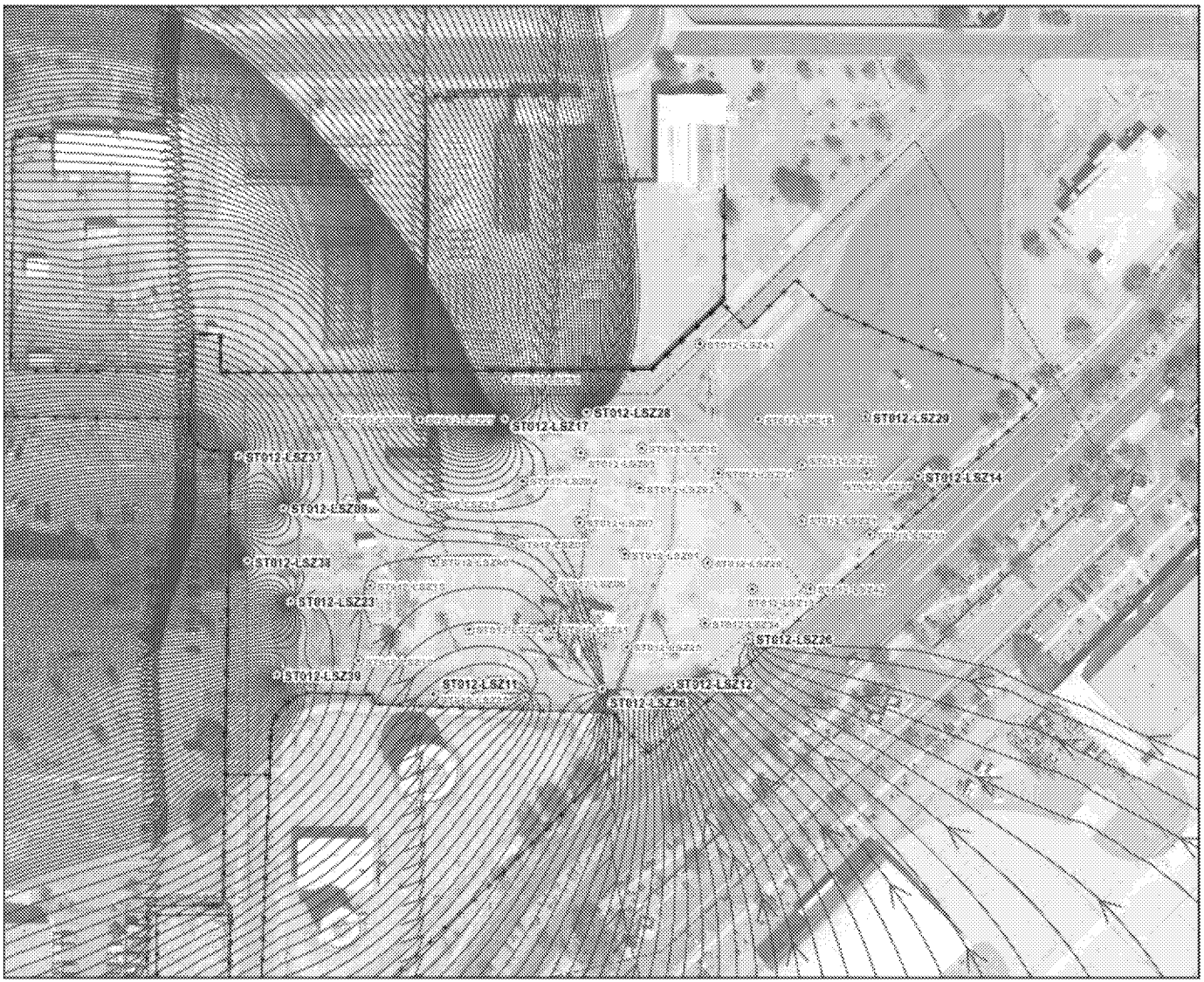
Legend

- Extraction Well Location
- Existing Well Location
- Uncaptured Pathline
- Captured Pathline

Optimization

- **Removed pumping from UWBZ10 and UWBZ31**
- **Added pumping to ST012-UWBZ21 and ST012-UWBZ28**

ST012 FVM5 – LSZ Pathlines – Original Pumping Configuration



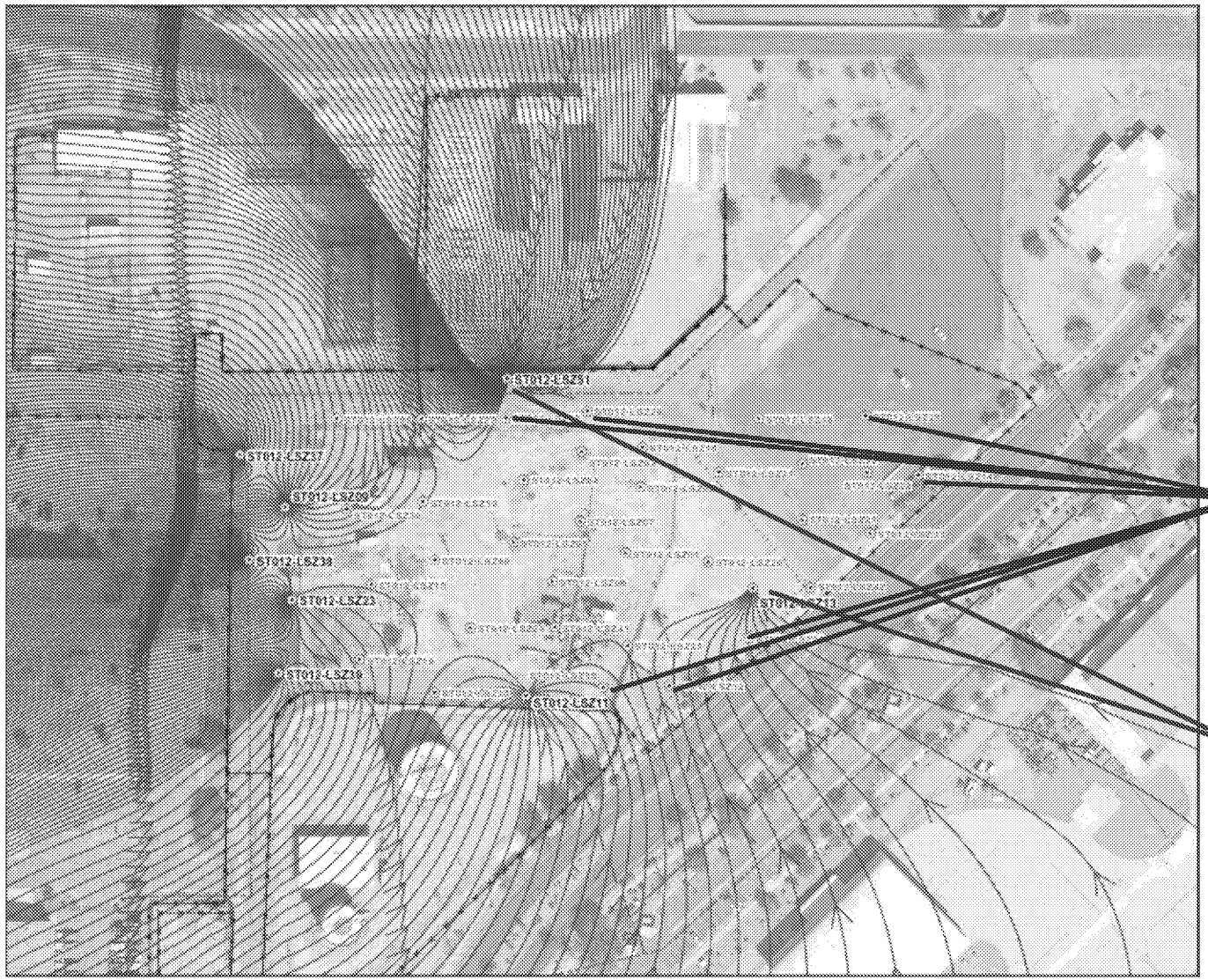
Legend

- Extraction Well Location
- Existing Well Location
- Uncaptured Pathline
- Captured Pathline

Observations

- **Capture of SEE TTZ area**

ST012 FVM5 – LSZ Pathlines – Revised Pumping Configuration



Legend

- Extraction Well Location
- Existing Well Location
- Uncaptured Pathline
- Captured Pathline

Optimization

- **Removed pumping from ST012-LSZ12, ST012-LSZ14, ST012-LSZ17, ST012-LSZ26, ST012-LSZ28, ST012-LSZ29, and ST012-LSZ36**
- **Added pumping to ST012-LSZ13 and ST012-LSZ51**

ST012 FVM5 – Modified Well List and Estimated Flow Rates

Modified Extraction Well Network Summary				
Well Identification	Phase Installed	Screened Interval (ft bgs)	Initial Target Pumping Depth (ft bgs)(1)	Estimated Pumping Rate (gpm)(2)
ST012-CZ07	SEE	145 – 160	155	3.5(2)
ST012-CZ08	SEE	145 - 160	155	3.5(2)
ST012-CZ18	SEE	145 - 160	155	8.4
ST012-CZ19	SEE	145 - 160	155	5.3
ST012-CZ21	Post-SEE Phase 1	140 - 150	155	5.2
ST012-UWBZ21	SEE	170 - 195	170	1.4
ST012-UWBZ22	SEE	170 - 195	170	1.8
ST012-UWBZ26	SEE	170 - 195	170	1.5
ST012-UWBZ27	SEE	170 - 195	170	3.9
ST012-UWBZ28(3)	Post-SEE Phase 1	170 - 195	170	0.8
ST012-UWBZ30	Post-SEE Phase 1	171 – 191	170	0.7
ST012-LSZ09	SEE	205.5 - 240.5	190	1.8
ST012-LSZ11	SEE	206.4 - 243.4	190	2.3
ST012-LSZ13	SEE	207.5 - 242.5	190	5.6
ST012-LSZ23	SEE	210 - 245	190	1.9
ST012-LSZ37	SEE	210 - 245	190	2.1
ST012-LSZ38	SEE	210 - 245	190	2.2
ST012-LSZ39	SEE	210 - 245	190	1.7
ST012-LSZ51(3)	Post SEE Phase 1	210 - 235	170	9.6
Total	-	-	-	63.2

•Notes:

ft bgs – feet below ground surface

SEE – steam enhanced extraction

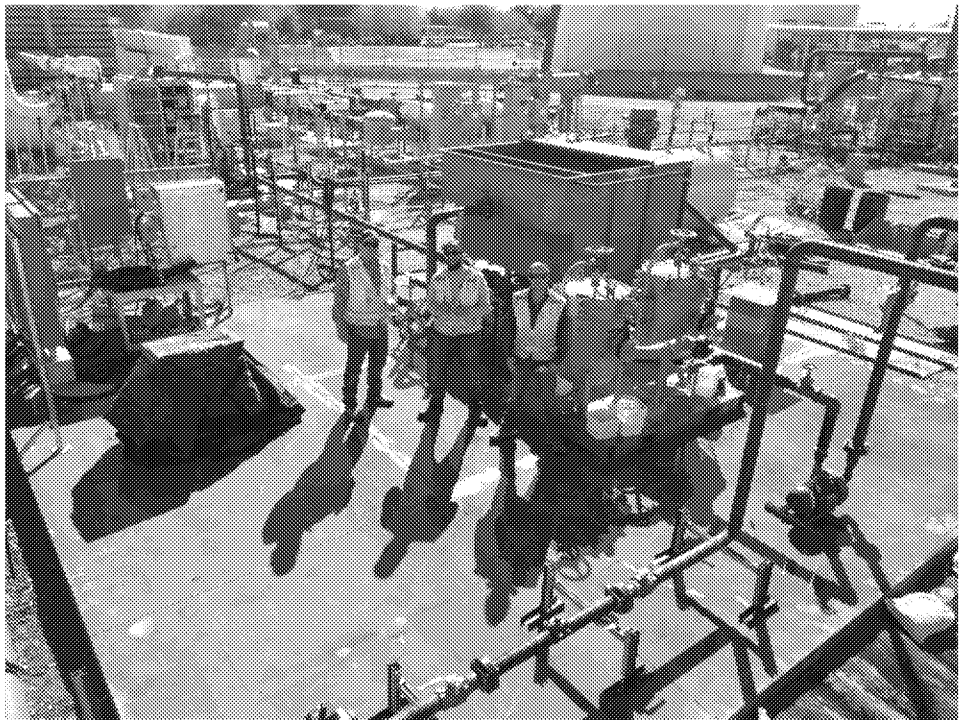
(1)The approximate initial target depth for water to be maintained in the well during pumping. Adjustments may be made based on groundwater pathline analysis of capture and observations during operation.

(2)Steady-state flow rate based on the groundwater model and the pumping elevation set points with the exception of ST012-CZ07 and ST012-CZ08 which were set at 3.5 gpm based on the pump capabilities.

(3)Dual-screened well ST012-UWBZ28/LSZ51

ST012 FVM5 - Containment

- **Construction Progress**
  - **Mechanical Installation Complete**
  - **Electrical Installation Complete**
  - **Instrumentation Installation Complete**
  - **Treatment System Commission Complete**
  - **Well Pump Installation Ongoing for Modified Pumping Network**



ST012 FVM5 - Containment

- **Other Activities**
  - **Chemicals Staged and Ready**
  - **Received City of Mesa Discharge Permit**
  - **Requested Modification to Permit**
    - Discussed and obtained verbal approval from COM for removal of high resolution pesticides analysis as permit requirement
    - Submitted written request
    - Conventional pesticides analysis will still be performed
    - High resolution analysis will only be conducted if necessary to confirm reported detections with conventional analysis

Site ST012 – Path Forward

- Complete installation and commission of modified pumping network (15 Feb 2017)
- Evaluate and discuss characterization and containment monitoring data at 14 Feb 2017 BCT meeting
- Status of characterization pending and decision to operate containment pending:
  - AF-ADEQ-EPA discussion on EBR vs active containment

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Fire Training Area Remedial Action

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Site ST035

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REGULATORY DELIVERABLE TRACKING

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BCT MEETINGS/CONFERENCE CALLS SCHEDULE

BCT Conference Call

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ACTION ITEMS

BCT Conference Call

31 January 2017